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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/796,199	03/10/2004	Charles Emory Hughes II	43689-016100	2437

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EXAMINER
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SWERDLOW, DANIEL

ART UNIT	PAPER NUMBER
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2615

SHORTENED STATUTORY PERIOD OF RESPONSE	NOTIFICATION DATE	DELIVERY MODE
3 MONTHS	01/31/2007	ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Notice of this Office communication was sent electronically on the above-indicated "Notification Date" and has a shortened statutory period for reply of 3 MONTHS from 01/31/2007.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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<b>Office Action Summary</b>	<b>Application No.</b>		<b>Applicant(s)</b>	
	10/796,199		HUGHES ET AL.	
	<b>Examiner</b>		<b>Art Unit</b>	
	Daniel Swerdlow		2615	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 20 November 2006.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-8 and 10-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4, 6-8, 10-16, 18 and 19 is/are rejected.
- 7) ☒ Claim(s) 5 and 17 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. **Claims 1 through 3, 6, 14, 15 and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Oyaba et al. (US Patent 4,991,687).**

3. Regarding Claim 1, Oyaba discloses a loudspeaker system having a line array of drivers (Fig. 1) comprising: an innermost (i.e., first) pair of drivers ( $H_l$ ,  $H_r$ ) to which signals are supplied (i.e., configured to receive a signal from a sound source) (column 2, lines 59-60); a center point (intersection of center axis that includes  $P_0$ ; see column 1, lines 20-21) about which the innermost pair of drivers is substantially centered with a distance  $d_2$  that corresponds to the distance  $d_0$  claimed between them and the drivers receiving a high pass filter output that corresponds to the signal comprising a first frequency band claimed; a second pair of drivers ( $L_l$ ,  $L_r$ ) that corresponds to the subsequent pair of drivers claimed, is arranged in the line array with the innermost pair of drivers and substantially centered about the center point with a center-to-center distance of  $d_1$  that corresponds to the distance  $4nd_0$  claimed where  $n=1$  and, therefore,  $d_1=4d_2$  (column 2, line 58), and to which signals are supplied through a low pass filter (receive a signal comprising a second frequency band) (column 2, lines 45-48), wherein the low pass filter and the high pass filter pass frequencies at and about a frequency  $f_c$  that corresponds to the

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common frequency band claimed and provide a common level of attenuation (i.e., 6 dB) at those frequencies (column 2, lines 48-63).

4. Regarding Claim 2, Oyaba further discloses a low pass filter on the second pair of drivers ( $L_l$ ,  $L_r$ ) that corresponds to the subsequent pair of drivers claimed (i.e.  $n>0$ ) (column 2, lines 45-48).

5. Regarding Claim 3, Oyaba further discloses a second set of low frequency drivers (i.e.,  $n=2>1$ ) spaced at four times the distance of the first set of low frequency drivers ( $L_l$ ,  $L_r$ ) (column 4, lines 48-56) with a division (i.e., corner) frequency of  $f_c$  such that the distance  $4d_1$  between the pair of drivers is equal to a wavelength  $\lambda_c$  corresponding to the division (i.e., corner) frequency  $f_c$  (column 2, lines 53-55). As such for  $n=2$ ,  $c=f_n d_n$  or  $f_2=c/4d_1$ , and the pair has a different corner frequency, as claimed.

6. Regarding Claim 6, Oyaba further discloses the low pass filter on the second pair of drivers ( $L_l$ ,  $L_r$ ) that corresponds to the subsequent pair of drivers claimed (i.e.  $n=1$ ) (column 2, lines 45-48) having a division (i.e., corner) frequency  $f_c$  such that the distance  $d_1$  between the second pair of drivers ( $L_l$ ,  $L_r$ ) that corresponds to the subsequent pair of drivers claimed is equal to a wavelength  $\lambda_c$  corresponding to the division (i.e., corner) frequency  $f_c$  (column 2, lines 53-55). As such for  $n=1$ ,  $c=f_n d_n$  or  $f_n=c/d_n$ , as claimed.

7. Regarding Claim 14, in addition to the elements cited above apropos of Claim 1, Oyaba further discloses a distance  $d_1$  between the second pair of drivers ( $L_l$ ,  $L_r$ ) that corresponds to the subsequent pair of drivers claimed of  $\lambda_c \pm 50\%$  (column 5, line 40). This teaches a range of  $d_1$  from  $\lambda_c/2$  to  $3\lambda_c/2$ . Oyaba further discloses a distance  $d_2$  between an innermost (i.e., first) pair of drivers ( $H_l$ ,  $H_r$ ) that corresponds to the distance  $d_0$  claimed in a range from  $d_1/4$  to  $d_1/2$

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(column 5, line 40). Substituting, this teaches a range of distance  $d_2$  that corresponds to the distance  $d_0$  claimed in a range from  $\lambda_c/8$  to  $3\lambda_c/4$ . Because  $\lambda_c = c/f$ , this corresponds to a range for  $d_0$  between  $c/8f$  and  $3c/4f$ , a range that includes  $c/2f$  as claimed.

8. Regarding Claim 15, Oyaba further discloses a low pass filter on the second pair of drivers ( $L_1, L_r$ ) that corresponds to the subsequent pair of drivers claimed (i.e.  $n>0$ ) (column 2, lines 45-48).

9. Regarding Claim 19, Oyaba further discloses a directivity pattern without side lobes (Fig. 4).

***Claim Rejections - 35 USC § 103***

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. **Claims 4, 8, 12, 13, 16 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oyaba in view of Steuben (US Patent 5,359,664).**

12. Regarding Claim 4, as shown above apropos of Claim 2, Oyaba anticipates all elements except the low pass filters being of first order. Steuben discloses use of first order low pass filter to provide specific frequency components to loudspeakers (Fig. 4; column 5, line 66-column 6, line 2). One skilled in the art would have known that such an arrangement provides a filtering function with a minimum of components, saving space and cost. It would have been obvious to

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one skilled in the art at the time of the invention to apply first order filters as taught by Steuben to the system taught by Oyaba for the purpose of realizing the aforesaid advantages.

13. Claim 8 is essentially similar to Claim 4 including the limitations of Claims 1 and 2, and is rejected on the same grounds.

14. Regarding Claim 12, Oyaba further discloses a second set of low frequency drivers (i.e., a third set of transducers that are low pass filtered) (column 4, lines 48-56).

15. Regarding Claim 13, as is shown below apropos of Claim 18, Oyaba discloses an inverse relationship between low pass filter frequency and separation distance,  $f_n = c/d_n$ . As such, Oyaba teaches the outermost transducers having the lowest frequency filter, as claimed.

16. Regarding Claim 16, as shown above apropos of Claim 15, Oyaba anticipates all elements except the low pass filters being of first order. Steuben discloses use of first order low pass filter to provide specific frequency components to loudspeakers (Fig. 4; column 5, line 66-column 6, line 2). One skilled in the art would have known that such an arrangement provides a filtering function with a minimum of components, saving space and cost. It would have been obvious to one skilled in the art at the time of the invention to apply first order filters as taught by Steuben to the system taught by Oyaba for the purpose of realizing the aforesaid advantages.

17. Regarding Claim 18, Oyaba further discloses the low pass filter on the second pair of drivers ( $L_l$ ,  $L_r$ ) that corresponds to the subsequent pair of drivers claimed (i.e.  $n=1$ ) (column 2, lines 45-48) having a division (i.e., corner) frequency  $f_c$  such that the distance  $d_1$  between the second pair of drivers ( $L_l$ ,  $L_r$ ) that corresponds to the subsequent pair of drivers claimed is equal to a wavelength  $\lambda_c$  corresponding to the division (i.e., corner) frequency  $f_c$  (column 2, lines 53-55). As such for  $n=1$ ,  $c=f_n d_n$  or  $f_n = c/d_n$ , as claimed.

18. **Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Oyaba in view of De Vries (US Patent 6,128,395).**

19. Regarding Claim 7, as shown above apropos of Claim 1, Oyaba anticipates all elements except the centered driver. De Vries discloses a directional loudspeaker array with a center driver (Fig. 2b, reference SP0; column 4, lines 20-29). De Vries discloses that such an arrangement provides superior side lobe level suppression. It would have been obvious to one skilled in the art at the time of the invention to apply the centered driver as taught by De Vries to the system taught by Oyaba for the purpose of realizing the aforesaid advantage.

20. **Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Oyaba in view of Steuben and further in view of Combest (US Patent 5,568,560).**

21. Regarding Claim 10, as shown above apropos of Claim 8, the combination of Oyaba and Steuben makes obvious all elements except the spacing  $d_0=1.2$  inches and  $d_1=4.8$  inches. As shown above apropos of Claim 14, Oyaba further teaches a range of distance  $d_2$  that corresponds to the distance  $d_0$  claimed in a range from  $\lambda_c/8$  to  $3\lambda_c/4$ . Because  $\lambda_c=c/f$ , this corresponds to a range for  $d_0$  between  $c/8f_c$  and  $3c/4f_c$ . As such, a distance  $d_0$  of 1.2 inches (i.e., 0.03 meters) corresponds to a crossover frequency in the range between 1400 and 8250 Hz. However, Oyaba is silent as to selecting a crossover frequency, saying only "the frequency range to be reproduced is divided at an arbitrary frequency or division frequency into a higher frequency range and a lower frequency range, each of which being reproduced through a corresponding pair of speakers" (column 1, lines 63-68). Combest discloses a loudspeaker system with a crossover

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frequency of 2100 Hz (column 6, lines 28-29). Combest further discloses that such an arrangement reduces interference and distortion. It would have been obvious to one skilled in the art at the time of the invention to apply the crossover frequency taught by Combest to the combination made obvious by Oyaba and Steuben for the purpose of realizing the aforesaid advantages.

**22. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Oyaba in view of Steuben and further in view of De Vries.**

23. Regarding Claim 11, as shown above apropos of Claim 8, the combination of Oyaba and Steuben makes obvious all elements except the centered driver. De Vries discloses a directional loudspeaker array with a center driver (Fig. 2b, reference SP0; column 4, lines 20-29). De Vries discloses that such an arrangement provides superior side lobe level suppression. It would have been obvious to one skilled in the art at the time of the invention to apply the centered driver as taught by De Vries to the combination made obvious by Oyaba and Steuben for the purpose of realizing the aforesaid advantage.

***Allowable Subject Matter***

**24. Claims 5 and 17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.**

25. Regarding Claim 5, as shown above apropos of Claim 6, Oyaba discloses a corner frequency  $f_n = c/d_n$ . Further, because Oyaba teaches a range of values for  $d$  of  $\pm 50\%$ , Oyaba



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discloses a corner frequency up to  $1.5c/d_n$ . However, Oyaba does not disclose or suggest a corner frequency of  $2c/d_n$  as claimed. As such, Claim 5 is allowable matter.

26. Claim 17 contains limitations similar to Claim 5 and is allowable matter for the same reasons.

### *Response to Arguments*

27. Applicant's arguments filed 2 February 2006 have been fully considered but they are not persuasive. Applicant alleges that Oyaba fails to disclose the two frequency bands comprising a common frequency band at a common level of attenuation as claimed in Claims 1 and 14.

Examiner respectfully disagrees. As shown in the prior art rejection above, Oyaba discloses one set of drivers receiving a high pass filter output that corresponds to the signal comprising a first frequency band claimed and the other set of drivers receiving a low pass filter output, with the low pass filter and the high pass filter pass frequencies both being  $f_c$ . As such, there is some commonality between the frequencies passed by the respective filters and some commonality of level of attenuation at and in the immediate vicinity of that frequency. Applicant's remaining arguments are limited to similarities with or dependence from Claims 1 and/or 14 and are unpersuasive for the same reasons.

### *Conclusion*

28. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action. The examiner can normally be reached on Monday through Friday between 7:30 AM and 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sinh H. Tran can be reached on 571-272-7564. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Daniel Swerdlow  
Primary Examiner  
Art Unit 2615

ds

29 January 2007